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## **FLASHLIGHT DEVICES AND ACCESSORIES**

### **REFERENCE TO RELATED APPLICATION**

5        This application claims priority to U.S. Provisional Patent Application Serial No. 60/446,183 filed February 10, 2003, which is hereby incorporated by reference in its entirety.

### **BACKGROUND**

10        The present invention relates generally to flashlights, and in particular to a flashlight adapted for convenient use in conjunction with other hand-held implements, such as firearms, or in conjunction with activities requiring the use of ones hands.

15        By way of background, a number of flashlights or flashlight holders are known that are designed for use in combat or self-defense situations. Several of these holders and flashlights are disclosed, for example, in U.S. Patent Nos. 6,270,231, 5,848,834, 5,167,446,  
20 4,542,447, 5,642,932, 5,363,285, 5,556,003, 5,345,368, 6,023,875, 5,752,633, 5,533,657, and 5,593,074. An additional such flashlight devices disclosed in EP0484891.

In spite of prior work in the area, there remain needs for improved flashlight devices for potential use in conjunction with other hand-held implements such as firearms, particularly in self-defense and/or combat  
5 situations, or when performing other tasks or activities that require two handed operation such as those that commonly occur in industrial environments or outdoor activities. The present invention is directed to these needs.

### SUMMARY OF THE INVENTION

One aspect of the present invention provides a flashlight adapted for use in conjunction with a firearm, especially a handgun, having adaptations for optimally positioning the light during use. In one embodiment of the present invention, a flashlight device is provided having a downwardly-extending lightbox, a downwardly-extending handle portion, and a transverse member connecting the lightbox and the handle portion. Illustratively, the handle portion and lightbox may depend from a generally horizontally extending transverse member, to provide a flashlight form convenient for handling during a two-handed firearm firing position, other two-handed operations, or in general other activities which benefit from manual dexterity of the hand grasping the flashlight. In more preferred embodiments, the device is configured so the positions of the lightbox and handle portion are moveable relative to one another to optimize adjustments for the user. For example, the lightbox and handle portion may be repositionable relative to one another in vertical and/or horizontal planes. In a most preferred form, the

invention provides a flashlight device wherein the lightbox and handle portion are both vertically and horizontally adjustable relative to one another so that a user can position the beam lower or higher, or to the  
5 left or the right, to provide an optimal direction for a light beam emanating from the lightbox, for example during a normal two-handed firing position of a pistol. The vertical and horizontal adjustments are desirably located on different portions of the flashlight device.  
10 For example, the lightbox may be rotatable in a horizontal plane relative to the transverse member to which it is attached; and the handle portion can be rotatable in a vertical plane relative to the transverse member to which it is attached.  
15 Additional preferred embodiments as well as features and advantages of the invention will be apparent from the following descriptions.

# **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 provides a side view of a flashlight device of the invention.

5        Figures 2A-2C provide side and end views of another flashlight device of the invention.

Figures 2D and 2E provide a side and left end view of another flashlight device of the invention.

Figure 3 provides a perspective view of a flashlight  
10 device of the invention in use during a two-handed firing position.

Figure 3A provides a perspective view of a flashlight device of the invention in a forward lighting position.

15        Figure 4 provides an illustration of internal circuitry of a flashlight device of the invention.

Figures 5A and 5B provide cutaway cross-sectional views of potential rotatable connections between transverse members and a lightboxes of flashlights of the  
20 invention.

Figure 6 provides a top view of a flashlight device of the invention in use during a two-handed firing position.

Figure 7 provides a side view of a flashlight device of the invention illustrating an offset angle between a handle portion and a lightbox of the device.

Figure 8 provides a cutaway view of a rotatable and  
5 lockable connection between a handle portion and a transverse member of a flashlight device of the invention.

Figure 9 provides plan views A and B of cooperating surface features on the transverse member (view A) and  
10 handle portion (view B) shown in Figure 8, providing a rotatable/locking mechanism using meshable locking plates.

Figure 10 provides a perspective view of a flashlight holster device of the invention.

15 Figure 11 provides a perspective view of the holster device of Figure 10 having a flashlight mounted therein.

Figure 12 provides a perspective view a flashlight/holster combination of the invention in use.

Figure 13 provides a cutaway perspective view  
20 illustrating a lightbox of another flashlight of the invention, including a slidable red lens.

Figure 14 provides a cutaway perspective view illustrating a lightbox of another flashlight of the invention including a hinged red lens.

Figure 15 provides a perspective view of a red lens  
5 appliance of the invention.

Figure 16 provides a perspective view of another red lens appliance of the invention.

Figure 17 provides a front perspective view of the appliance of Figure 16 connected to a flashlight  
10 lightbox.

Figure 18 provides a back perspective view of the appliance of Figure 16 connected to a flashlight lightbox.

Figure 19 provides a perspective view of another  
15 flashlight holster of the invention.

Figure 20 provides a front view of another flashlight of the invention including a strap assembly handle.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

For the purpose of promoting an understanding of the principles of the invention, reference will now be made to certain preferred embodiments thereof and specific  
5 language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations, further modifications and applications of the principles of the invention as described herein being  
10 contemplated as would normally occur to one skilled in the art to which the invention relates.

As disclosed above, the present invention provides flashlight devices and apparatuses suited for use in two-handed grasping operations or other operations where  
15 manual dexterity of the hand holding the flashlight is beneficial, for example in self-defense and/or combat situations, in industrial environments and/or in outdoor recreation. With reference now to Figure 1, shown is a plan view of one preferred flashlight device 20 of the  
20 present invention. Flashlight device 20 includes a generally downwardly-extending lightbox 21, a generally downwardly-extending handle portion 22, and a transverse member 23 connecting the lightbox 21 and handle portion



22. Lightbox 21 includes a generally cylindrical body 24 having mounted therein a light source 25 situated behind a lens 26, preferably formed with a relatively shatter-proof plastic material such as Lexmar. Light source 25  
5 is energizable by one or more batteries residing within the lightbox 21 as will be discussed herein below. The light source 25 will preferably be capable of delivering at least about 20,000 candle power (CP), typically in the range of about 20,000 to about 50,000 CP. Higher or  
10 lower intensities may also be desirable for particular utilities for the flashlight. The light source 25 may, for example, include a halogen, xenon or other pressurized gas bulb, or one or a plurality of light emitting diodes (LEDs); in one embodiment of the  
15 invention, the light source 25 includes a plurality of LEDs, for example 2, 3, 4, 5 or 6 or more LEDs.

Lightbox 21 is connected to transverse member 23 at its upper end 27. Although this connection could be integral, it is preferred that the connection be a  
20 moveable connection, for example providing for rotation within a horizontal plane so that a user of the flashlight can adjust the direction of the light beam

emanating from the light source 25 in a horizontal fashion.

Handle portion 22 includes a lower end 28 and an upper end 29, and a central portion 30 spanning 5 between the lower end 28 and upper end 29. Central portion 30 can if desired have external adaptations to improved the ergonomic character of the handle portion 22. For example, central portion 30 may include one or more convex or concave sections. In one embodiment, as 10 illustrated in Figure 1, central portion 30 includes an inwardly-facing (toward the lightbox 21) convex portion 31 adapted to ergonomically cooperate the palm of the hand in a firing position (see e.g. Figure 3). As also shown in Figure 1, handle portion 22 can incorporate a 15 strap extending inwardly from handle portion 22 and through which the user's hand can be placed while holding the flashlight 20. As shown in Figure 3, in the firing position, the handle portion 22 is grasped in a hand of the user, the transverse portion 23 extends overtop the 20 hand, and the lightbox 21 extends down the back side of the hand. If desired, handle portion 22 can be covered with or made of a material with a relatively high coefficient of friction compared to other portions of the

flashlight to improve gripping properties. For example, handle portion 22 may be covered with a polymeric sleeve, including, e.g. an elastomeric sleeve such as a neoprene sleeve.

5        Handle portion 22 is connected at its upper end 29 to transverse member 23. Although this connection may be integral, it is preferred that this connection provide for movement of the two elements relative to one another. For example, in one preferred embodiment the handle  
10        portion is rotatable in a generally vertical plane relative to the transverse member 23. In doing so, it is also preferred that the rotated position be lockable between the handle portion 22 and transverse member 23. This locking or fixing of the positions may be  
15        facilitated, for example, by appropriate detent devices or for example by providing a first surface 32 of or connected to the handle portion 22, which cooperates with a second similar surface 33 connected to the transverse member 23 (See e.g. Figs. 8 and 9). The two surfaces 32  
20        and 33 have cooperating ridges, teeth or other interlocking members. While a connector such as a screw 34 (see Figure 7) is positioned to allow separation between the plates, the handle portion 22 and transverse

member 23 can be rotated relative to one another. Thereafter, when rotated to the desired degree, the connector 34 is utilized to fix the two plates against one another so as to cause the interlocking members on  
5 the plates to mesh, and fix the position of the handle portion 22 and transverse member 23 relative to one another. In this fashion, a user of the device 20 can adjust the vertical orientation of the light beam to optimize its direction during a normal two-handed firing  
10 position with a handgun (see e.g. Figure 7).

Figures 2A-2C illustrate another flashlight embodiment 20A of the invention (2A, front view; 2B, right end view; 2C, left end view). Flashlight 20A is similar in many respects to flashlight 20 of Figure 1,  
15 and has parts correspondingly numbered with the designator "A". Flashlight 20A, however, has a lightbox 21A that includes both a generally cylindrical portion 24A, and a flat front face portion 24A' in which lens 26A and light source 25A are mounted. As shown, face portion  
20 24A' has a generally planar front, which extends into a generally rounded back portion. Flashlight 20A also includes a polymeric sleeve 22A' on its handle portion 22A, as well as a strap "S" through which a user's hand

may be placed. Strap S may be a loop of material received under sleeve 22A' as shown, or may be held to flashlight 20A by buckles or in any other suitable fashion. As well, strap S may also have connecting portions S1 and S2 as shown, which allow for adjustment of the size of the strap loop. This connection may be achieved, for example, by suitable hook and loop fasteners attached to and/or formed within the material of the strap S. Flashlight device 20A also incorporates a rotatable connection between handle 22A and transverse member 23A. In the illustrated device, transverse member 23A includes a downwardly depending leg 23A' with a generally "U" shaped external profile, and handle portion 22A includes an upwardly extending leg 22A'' with a cooperating, generally inverted "U" shaped external profile (lower periphery shown in phantom in Figure 2C). These two legs provide opposing plates or faces that contact one another for a rotatable, friction fit. The handle portion 22A is connected to transverse member 23A by a connector 34A such as a screw. The connection can be sufficiently tight to provide for a snug but rotatable relationship between the handle 22A and transverse member 23A. Alternatively or in addition, the connector can be

adustable (e.g. as in a screw) so as to enable loosening the fit, adjusting the angle of handle 22A relative to transverse member 23A, and then tightening the fit. Additionally, as discussed hereinabove in connection with  
5 Figure 9, meshing gears, teeth, ridges or other surface features can be provided on the faces of legs 23A' and 22A'', to facilitate a locked and/or fixed attachment between the faces.

Figures 2D and 2E provide cutaway side and left end  
10 views corresponding to those of Figures 2A and 2B, except the flashlight device has a modified front face in which a lip 24A'' or other projection extends upwardly from the face 24A', such that it overlies the front face of transverse member 23A. As well, transverse member 23A  
15 has a rounded end 23A'. In this manner, the inward rotation of lightbox 21A is restricted by contact between lip 24A'' and the front face of transverse member 23A, but lightbox 21A can be freely rotated outwardly, and has about 180 degrees of rotational freedom, so that the  
20 light can be positioned to a forward lighting position as described herein, and a position reversed from that shown in Figures 2D and 2E to provide more effective use in either hand.

With reference now to Figure 4 together with Figures 1 and 2, provided is a drawing illustrating a potential configuration for the internal electronics of the flashlight device 20,20A. Light source 25,25A is positioned within lightbox 21,21A and is powered by one or more batteries 40 mounted within the lightbox 21,21A. Access to the battery or batteries 40 can be provided, for example, via a threaded cap 21',21A' located at the bottom of lightbox 21,21A. Positive and negative leads 41 and 42 create a circuit in conjunction with light source 25,25A and switch 43,43A. For these purposes, leads are positioned through a central channel 44 extending between lightbox 21,21A and transverse member 23,23A. As shown, switch 43,43A is provided upon transverse member 23,23A, and is spatially located atop or overlying handle portion 22,22A or at a position along transverse member 23,23A between handle portion 22,22A and lightbox 21,21A. For instance, in one embodiment, switch 43,43A can be provided adjacent or in proximity to the outer edge of the transverse member 23,23A overlying the outer edge of handle portion 22,22A, to provide convenient access for operation during a two-handed firing position or other manual hand activities (see e.g.

Figures 3 and 6). Switch 43,43A can be of any suitable design for energizing and de-energizing the light source 25,25A with the battery or batteries 40. Preferably, switch 43,43A is a pressure-sensitive switch functional  
5 to energize the light source 25,25A upon the exertion of pressure, but without locking or fixing the switch in the "on" position. In this fashion, the user of the flashlight can more readily briefly energize, and then de-energize the light source 25,25A to fix the position  
10 of an article or person, but without continued illumination. In addition to a "pressure-on" position, such a pressure-sensitive switch may, if desired, have a fixed "on" condition that is achieved upon exerting greater than a predetermined level of pressure on the  
15 switch.

With reference now to Figure 5 in conjunction with Figure 1, shown is one potential embodiment of the invention for connecting the lightbox 21 to the transverse member 23. In particular, in the illustrated  
20 arrangement a number of indexed or predetermined positions are defined between the lightbox 21 and the transverse member 23. For example, cutouts or other depressions 45 may be provided within an outer side



surface of the lightbox 21 at its upper end, and a cooperating member 46 such as a ball may be provided on the transverse member 23 for cooperating with depressions 45 located around the circumference of lightbox 21.

5 Cooperating member 46 can for example be biased toward the lightbox 21 with a spring 47 or other biasing device, to provide an appropriate level of resistance to hold lightbox 21 in a position defined by cutouts 45, but which resistance can be overcome with sufficient force to

10 move the lightbox 21 to an alternate indexed position. Additional proturbances 48 can be provided around in the inner surface of the transverse member connection to assist in the indexing function as well.

With reference now to Figure 5A in conjunction with

15 Figures 2A-2E, shown is an illustration of another manner of rotatably connecting lightbox 21A to a transverse member 23A. In this embodiment, the ball 46A and spring 47A combination for the detent positions is received within an aperture in the lower surface of transverse

20 member 23A. Cutouts 45A or other indentations for cooperating with the ball 46A are then located upon an upper surface of lightbox 21A. A hollow bushing 49A is received within a shouldered bore in transverse member

23A, and a cooperating threaded member 49B is received through bushing 49B and threaded into a corresponding bore in the upper wall of lightbox 21A. A rotatable connection is thereby provided. As shown, threaded member 49B can be hollow or otherwise include a thru-bore 44A so that wires 41A and 42A can pass through the connection. Wires 41A and 42A can then, if desired, pass through an internal opening or bore within transverse member 23A (Figure 5A, shown in phantom) for connection to a switch as described hereinabove.

With reference generally to Figures 1, 2A-2E, and 5A and 5B, any number of indexing positions for the lightbox 21,21A can be provided. In one embodiment, light box 21,21A will be restricted to 360 degrees of rotation or less, for example 180 degrees of rotation, having multiple defined indexed positions. Restricting rotation of the lightbox 21,21A will assist in preventing undue twisting of leads 41,42,41A,42A in the simple design illustrated, where the leads are fixed or otherwise tend to rotate along with the lightbox 21,21A. Of course, other circuitry or wiring designs could be adopted to address this problem as well, including for example the use of a rotatable electrical connection. For example,

use may be made of conductive metallic components such as metal disks or rings that provide electrical contact from the handle and switch to the light box. The two components, one wired to the switch and one connected to  
5 the light box, would remain in constant contact with the one another. The component wired to the switch would remain fixed while constantly making contact with the other component that would be connected to the light-box. The component wired to the light-box would rotate, for  
10 example 180 degrees. Another rotatable electrical design could incorporate a wired, spring-loaded pin which would make contact with a metallic component connected to the light box.

In a preferred design, lightbox 21,21A will have  
15 indexed positions spaced about 90 degrees from one another. With reference to the orientation of the devices 20,20A as shown in Figure 1 and 2, these positions may be defined with the light source 25,25A facing as shown (e.g. as used in a firearm firing  
20 position), 90 degrees clockwise therefrom (thus facing directly away from handle 22,22A for "forward lighting" (see Figure 3A), and 180 clockwise from the illustrated position. This latter position allows the device 20,20A

to be similarly used in either the left or right hand during firing or other manual activities. In this regard, in addition to or as an alternative to indexed positions wherein light source 25,25A is directed at a 90  
5 degree angle relative to the axis of transverse member 23,23A, indexed positions may be provided angled slightly inwardly from 90 degrees (see e.g. Figure 6) so that the light beam from light source 25,25A will be more directly aimed at a target during a firing position. The angle in  
10 this situation will vary depending upon the anticipated target distance, and upon the useful range of the light source 25,25A.

With reference now to Figures 10-12 in connection with Figures 1 and 2, illustrated is a holster 50 for use  
15 in connection with a flashlight 20,20A of the invention. Holster 50 generally includes a member 51 for connection to the belt of a user, for example by clipping on the belt or having the belt string through the member 51. Holster 50 also generally includes a receiving portion 52  
20 for receiving the lightbox 21,21A of the flashlight device 20,20A. In particular, preferred holster device 50 includes a first end 53 and a second end 54, which serve to cover the upper and lower surfaces of the

lightbox 21,21A and help an alignment of the flashlight 20,20A during a holstering function. Receiving portion 52 includes at least one cutout portion, and preferably a plurality of cutout portions along the body providing 5 openings 55 for receiving the light source 25,25A and lens 26,26A of the lightbox 21,21A, so that the flashlight 20,20A may be used to provide illumination even when holstered (see e.g. Figures 11 and 12). Preferably, holster device 50 will include at least one 10 member 56 located between ends 53 and 54 extending sufficiently up and potentially around lightbox 21,21A to retain flashlight 20,20A and holster 50 by gravitational force and/or by friction or snap fit.

With reference now particularly to Figure 12, 15 illustrated is the flashlight device 20,20A contained within the holster 50, with lens 26,26A of flashlight 20,20A exposed for illumination in a forward direction. Holster 50 is secured to the side of a user 100, for example by attachment to a belt as discussed above. As 20 shown in Figure 12, the holster 50 has been rotated to a vertical orientation. This is provided in the preferred holster device by incorporating a swivel or other moveable attachment between attachment member 51 and the

receiving portion 52 of the holster device 50. Such a swivel function may for example be provided by rotateable pin connector 57 connecting attachment member 51 and receiving portion 52 of holster device 50 as can also  
5 been seen in Figures 11 and 12, when flashlight device 20,20A is received within holster 50, handle portion 22,22A is located external of receiving portion 52 of holster 50 and thereby readily available to grasp. In addition, the illustrated position can provide for  
10 "hands-free" forward illumination when the flashlight 20,20A includes a fixed "on" switch position.

Housing components of devices of the invention are preferably made from metal or an impact-resistant plastic, such as ABS. In addition, flashlights of the  
15 invention are desirably constructed to be waterproof, for example incorporating O-rings between moving parts, and plastic parts are preferably made fire retardant either in their composition, or with a suitable fire retardant coating. Flashlights of the invention also desirably  
20 incorporate attachable or attached red lenses to cover the light source 25,25A. Such red lenses facilitate dimming the light source, and in combat or defense

situations make it more difficult for a target to discern people or things behind the light source.

With reference now to Figures 13 through 19, a number of illustrative red lens appliances useful in conjunction with flashlights 20 and 20A, or modified versions thereof, are shown. Shown in Figure 13 is a partial cutaway view of such a flashlight 20C, including a lightbox 21C with an extended, front flat panel incorporating a slidable red lens that can be selectively positioned over the primary clear lens 26C. In particular, an external panel 60 fixed to the lightbox 21C defines an internal cavity and has a cutout 61 sufficient to expose lens 26C. A red lens 62 (shown in phantom) is slidably received within the defined cavity, and has an attached manual slider member 63 protruding through a slot 64 in the panel. In this fashion, a user can manually (e.g. with a finger) slide the red lens 62 overtop of and off of the light source 25C as desired in a particular situation. The position of the red lens 62 within the cavity can be maintained for example by a relatively light friction fit within the cavity, or by other mechanisms by which elements of or attached to the lens 62 cooperate with surrounding surfaces.

Additionally, red lens 62 can be sized to have dimensions larger than those of cutout 61 so that lens 62 does not escape or get caught up in cutout 61. Internal channels may also be provided within the defined cavity, in which  
5 the outer edges of lens 62 travel. As well, instead of cutout 61, panel 60 may include a transparent lens mounted therein to serve in addition to or as an alternative to any other transparent lens of the flashlight 20C.

10 Figure 14 provides a cutaway perspective view of another flashlight embodiment 20D of the invention including a red lens 65 received within a frame 66 hinged to the lightbox 21D.

Figure 15 provides an appliance 70 in which a red  
15 lens is incorporated in a slidable fashion. Appliance 70 includes a first member 71 having a slot therein and an opening 72, and a second member 73 slidably received in the slot. Second member 73 includes a red lens 74, wherein sliding second member 73 into first member 71  
20 exposes the red lens 74 in the opening 72. An appliance such as appliance 70 can be built into, fixedly attached or removably attached (e.g. using a clinging mechanism similar to that shown in Figures 16-18 below) to a



flashlight device such as 20 or 20A (Figures 1 and 2) with the opening 72 positioned over lens 25 or 25A. Selective use of the red lens 74 is thereby enabled.

Figures 16-18 illustrate another red lens appliance  
5 80 of and for use in the invention. Appliance 80 has a body 81 including a double-walled front panel 82. Panel 82 defines a slot between its two walls for slidably receiving a red lens 83 (shown partially in phantom). Panel 82 also defines a lens opening 83 and an elongate  
10 slot 84. A manual slider member 85 attached to the red lens 83 is exposed through the elongate slot 84, for manual operation to selectively position the red lens into and out of the lens opening 83. Body 81 also includes deformable members 85 and 86 which can be  
15 deformed so as to provide a mechanical fit such as a snap or friction fit around a cylindrical or other correspondingly configured portion of a lightbox such as 20 or 20A (see also Figures 1 and 2). In this fashion a user can both selectively connect and disconnect the  
20 appliance 80 with the flashlight, and selectively use or not use the red lens 82 when the appliance 80 is connected.

With reference to Figure 19, shown is another holster appliance 90 of and for use in the present invention. Appliance 90 includes a clip portion 91 for attachment to a belt or other similar structure of a user, that is attached to a body 92 adapted for providing a mechanical fit such as a snap or friction fit around a cylindrical or other correspondingly configured portion of a lightbox such as 20,20A (see also Figures 1 and 2). Body 92 thus can include at least one deformable member 93 configured to fit around and cling to a lightbox such as 20,20A. Desirably, body 92 can be designed so as not to cover or block the lens and light source of such lightboxes, so that the flashlight can be effectively used for illumination while worn attached to the belt of a user. As well, the attachment of body 92 to clip portion 91 can be via a rotatable connection, such as at 94, so as to provide flexibility in use.

With reference to Figure 20, illustrated is another flashlight 20E of the present invention. Flashlight 20E can include features generally corresponding to those of the lightboxes and transverse members described for other embodiments hereinabove. However, a different type of handle is provided. In particular, the handle is provided by a strap

assembly 96 including first and second strap members 96A and 96B forming an enclosed loop 95 to receive a user's hand. Strap assembly 96 is connected at its upper end to the transverse member 23E and at its lower end to the lower portion  
5 of the lightbox 21E. The connection to lightbox 21E is such that the lightbox 21E still can rotate. This may be achieved, for example, by incorporating a ring into the structure of lightbox 21E that is rotatable relative to the remainder of the lightbox 21E, (for example a ring captured within a groove  
10 defined between a battery cap and a shoulder of the lightbox housing), or by providing a ring received around lightbox 21E to which the strap assembly 96 is attached.

While the invention has been described in detail above with reference to specific embodiments, it will be  
15 understood that modifications and alterations in the embodiments disclosed may be made by those practiced in the art without departing from the spirit and scope of the invention. All such modifications and alterations are intended to be covered. In addition, all  
20 publications cited herein are indicative of the level of skill in the art and are hereby incorporated by reference in their entirety as if each had been individually incorporated by reference and fully set forth.